Communities facing urban depopulation: exploring people's environmental preferences. A case study of Lisbon, Portugal

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1. Abstract

This study focuses on the relative importance for resident's wellbeing of different attributes of the living environment, namely urban typology, population density, green space type, green space quality, community and security, in the context of urban depopulation.

The study used conjoint analysis, a methodology for comparing preferences, in three neighbourhoods in the Portuguese capital city. A total of 130 participants were recruited to take part in this study, based on whether their residential neighbourhood was growing in population (N=49) or depopulating (N=44); or whether they were searching for a new house at the moment (N=37).

The results showed that residents of depopulating neighbourhoods value the presence of a friendly community more than the other participants and were less negative about high population densities. House buyers valued environments with good quality green spaces significantly more than the other two groups.

These findings suggest that a friendlier community and the quality of its green spaces are key attributes in encouraging current dwellers to remain, and in attracting new residents to move in. These two attributes are known to be relevant factors for overall citizens' quality of life, health and wellbeing; they should, therefore, be given particular consideration in any intervention in depopulating contexts.

Keywords

living environment, wellbeing urban depopulation, conjoint analysis,

1. Introduction

Urban depopulation is a topic of increasing interest, due to a worldwide rise in the number of cities experiencing population decline, especially in the northern hemisphere (Oswalt, 2008). These cities display common traits: selective out-migration of younger and more educated people, declining economies and employment markets, shrinking public and private investment power (Fritsche et al., 2007), urban dereliction and abandonment, and increased urban vacancies (Oswalt, 2008). These conditions are extensively recognised as conducive to systemic impoverishment and socio-economic deprivation (Blanco *et al.*, 2009; Audirac, 2018; Manville and Kuhlmann, 2018). with consequences for citizens' wellbeing, with studies demonstrating that shrinking areas show higher mortality rates (Smith, Shaw and Dorling, 1998; Brimblecombe, Dorling and Shaw, 2000), higher probability of 'disease burden' (Terschüren *et al.*, 2009) and potential health hazards such as, for example, vector-borne and water-borne pathogens (Gulachenski *et al.*, 2016).

This study aimed to understand how depopulation can impact resident's self-reported preferences for urban conditions conducive to enhanced levels of wellbeing, namely urban typology, population density, green space type, green space quality, community and security. A literature review on the impacts of shrinking cities resulted in the identification of three main domains of transformation, which are thoroughly explained in the background and context section of this paper: (1) communities instability, (2) urban and infrastructural dereliction and fragmentation, as well as physical disorder and increased perception of insecurity, and (3) transformed green/open spaces. These same concerns have been identified and reviewed by Nassauer and Raskin (2014) and the key issues from the literature for these domains are identified below.

2. Background and Context

This section presents in more detail the three domains of transformation mentioned above, highlighting how they can impact wellbeing. It moreover adds some notes on how these three domains can be interrelated and, finally, how the city of Lisbon was used as a case study.

2.1. Domain 1: Unstable communities

Shrinking cities are characterised by selective out-migration, triggering phenomena of social segregation (Haase, 2008; Bini, 2011; Cortese, 2013) which impact people's health and wellbeing, in accordance with social capital theory (Islam *et al.*, 2006) (Kim et al., 2008). The mechanisms that underlie this effect are still unclear. Whereas some authors argue that the stress levels triggered by the lack of a supportive community might be one of the keys for this negative health effect (Abbott and Freeth, 2008; Chen *et al.*, 2014; Jay and Andersen, 2018), others advocate a behavioural component, namely that an increased level of physical activity in neighbourhoods with high social capital is the main trigger for this effect (Mohnen *et al.*, 2012). Communities with high levels of social capital are those with higher numbers of residents willing, or prepared, to help other members of that community, and to a greater extent. These contexts reinforce social cohesion and collective efficacy, meaning that supportive communities tend to be better equipped with tools to achieve a common good or goal. Such mechanisms are an asset, not only for residents' health and wellbeing (Mahmoudi, 2016) but also for longevity and resilience, which are particularly important during periods of difficulty, as found in many depopulating contexts (Kim et al., 2008; Koyama et al., 2014).

Social capital experts differentiate between *bonding* and *bridging* social networks: a bonding social network is one where most participants belong to the same socio-economic background, and a bridging one is characterised by diverse social, economic, racial, ethnic and religious

backgrounds. The resources available to the latter tend to be wider and richer, and although a bonding community has access to strong social cohesion and supportiveness, the resources to be shared may be meagre and often negative (Cattell, 2001). Kawachi et al. (2008), citing Portes (1998), describe the 'dark side of social capital' as: an imposed demand for support; suspicion regarding difference; exclusive in-group solidarity; and down-levelling of social norms (Kawachi et al., 2008, p.5). Down-levelling norms might trigger crime, generalised drug or alcohol abuse, suicidal ideation, or antisocial behaviours. Conversely, Lin (2008) asserts that individuals with wider and more diverse networks - bridging social networks - generally have better access to jobs and a higher probability of having influential politic/civic roles.

Depopulation processes are known to drain communities' diversity, promoting a *bonding* social network, and to fragment them, by lowering human density. The research of Knudsen and Florida (2007) has detected that it is not only the concentration of creative professionals that raises innovation, but that density alone is also an innovation booster, meaning that density and creativity work in favour of innovation, when both, or just one, are present (Knudsen *et al.*, 2007).

Depopulating urban communities are, therefore, at risk of diminishing social capital levels by a progressive dominance of bonding social networks (Nassauer and Raskin, 2014) and dispersion, preventing already depressed communities from counteracting their social decline. Urban population in-migration can counteract demographic homogenisation, contributing to a richer and more diverse community where bridging social networks can be established. According to Diez Roux's (2016) review on the relationship between neighbourhood qualities and public health, one of the political actions that are believed to potentially counteract neighbourhood-based health problems is reduced social class segregation in these neighbourhoods. Diez Roux further clarifies that a reduced social segregation does not equate with gentrification as defined by Ruth Glass

(1964) in *London: Aspects of Change,* where working classes were overwhelmingly replaced by high-middle classes in central neighbourhoods, forcing the real estate prices to rise, and pushing the community towards a new bonding-type of social capital, but this time on the wealthy extreme.

2.2 Domain 2: Urban and infrastructural transformations, physical disorder and insecurity

Depopulation has transformed the fabric of many cities by means of extensive demolitions (Haase, 2008). Detroit is the most iconic example, but there are other cities where demolition has been favoured, as for example in Liverpool (UK), Ivanovo (Russia) and Halle/Leipzig (Germany) (Oswalt, 2006). A higher resilience to demolitions is typical in cities with denser urban fabrics (Ryan, 2012). However, even when demolition does not occur, there are still significant urban impacts, since long-term tenement and other building vacancies will lead to decreased population density and infrastructure under-use – water, sewage, transport, education and health – (EEA, 2009; Reckien, 2011; Rink, 2012) which has a considerable influence on energy efficiency, and dereliction. Underused water supplies and sewage systems also threaten water quality. Transport inefficiency triggers increased use of private cars, affecting deprived communities who will have poorer access to social infrastructures like schools and hospitals, as well as jobs, according to the European Environmental Agency, when comparing depopulating cities across Europe (EEA, 2009).

However, urban sprawl is still the main feature of land-use change in many depopulating cities in Europe (EEA, 2009; Kroll, 2010; Reckien, 2011). The analysis by Haase et al. (2013) shows that, even in cities where both population numbers and housing units are decreasing, the land consumption trend persists, showing an inability or lack of desire for political regulation.

It is often advocated that vacant land could be made available for urban construction and could therefore be used as a tool to restrain this trend, helping to recover increased levels of urban density

and walkability (Rodríguez *et al.*, 2009); reduce carbon footprints particularly in medium-high density neighbourhood (Jones and Kammen, 2014); and prevent loss of agricultural land and fragmentation of ecosystems (Hennig *et al.*, 2015). This urban re-densification can potentially contribute to neighbourhoods' walkability which in turn can have a positive impact on peoples' health levels in respect to obesity, diabetes and cardio-vascular diseases, due to increased physical activity (Frumkin, 1974; Frank *et al.*, 2005; Ivory *et al.*, 2015; MacDonald Gibson *et al.*, 2015). On the other hand, extreme high densities have also been linked to higher levels of stress (Kennedy, Daniel; Adolphs, 2011).

Building dereliction is also normally associated with a neighbourhood's physical disorder and this, in turn, with greater feelings of hopelessness (Mair, Kaplan and Everson-Rose, 2012) or even depression (Latkin and Curry, 2003; Galea *et al.*, 2005; Matheson *et al.*, 2006), and perceived crime/crime rates (Sampson and Raudenbush, 2000). The broken window theory (McKee, 2014) is precisely based on the assumption that physical disorder somehow invites further incivilities, namely crime related activities. In its turn, an increased level of local crime has been linked with mental health problems, namely anxiety and stress, particularly in women (Dustmann and Fasani, 2016).

For Nassauer and Raskin (2014), the physical evidence of social capital - order, cleanliness, safety, etc. – may deter more abandonment and this might be achieved with temporary financial help for limited urban communities, leaving other spaces to be repurposed as parklands/woodlands as a means of reinforcing the ecological services of these urban areas.

2.3 Domain 3: Transformed green/open spaces and their use

There is evidence from Leipzig that, in neighbourhoods where vacant land was used to establish public parks, community gardens, and green outdoor spaces, the perceived quality of life has improved (Schetke, 2008). These improvements have triggered an increased interest in 'green infrastructure' reinforcement, with the aim to contribute to both to the health and wellbeing of these communities and to the ecological urban balance of these cities:

> "Green Infrastructure is a strategically planned and delivered network comprising the broadest range of high quality green spaces and other environmental features. It should be designed and managed as a multifunctional resource capable of delivering those ecological services and quality of life benefits required by the communities it serves and needed to underpin sustainability" (Wood 2009, p.7).

The view that a city could "produce" land within its perimeter – landscape expansion - (Nassauer and Raskin, 2014; Lima and Eischeid, 2017) can be regarded as an opportunity to increase citizens' proximity to natural spaces and to strengthen cities' ecosystems. The associated advantages would include: water, air and material fluxes in the city (Spirn, 1984); and citizens' physical and mental health (Ward Thompson, 1998; Mitchell et al., 2011; Ward Thompson & Aspinall, 2011; Mitchell, 2012; Hartig et al., 2014); better storm water management (Albro, Burkholder and Koonce, 2017); and growth of seed banks (Lokman, 2017), or biodiversity reserves (Langer, 2012). The health improvements, in particular, might involve lowered levels of stress (Ward Thompson et al., 2012; Roe et al., 2013;), less depressive mood (Rautio *et al.*, 2018) increased physical activity (Pietilä et al., 2015), and reduced exposure to pollutants, noise or heat (Ward Thompson & Silveirinha de Oliveira, 2016). These mechanisms lessen the health inequalities related to income deprivation (Mitchell & Popham, 2008), being assets for general wellbeing. The reinforcement of green infrastructures is both theoretically justifiable and proven

to have had good results, as for example in Leipzig, although it has in some instances reinforced gentrification processes (Anguelovski *et al.*, 2018).

2.4 Domains of transformation: Some final comments

There are numerous connections between the three domains presented in the previous sections, namely: the suggestion that the quality of green spaces is a determinant in people's attachment to their community (Kim and Kaplan, 2004; Tzoulas *et al.*, 2007; Matsuoka and Kaplan, 2008); that well cared for or beautiful places are key for communities' satisfaction, and that perceived beauty is strongly correlated with availability of outdoor parks (Florida et al. 2011); and that urban features and population densities are often associated with increased levels of physical activity and social interaction, potentially leading to more social cohesion. Jacobs (1961) often referred to the advantages of dense, multi-storey apartment neighbourhoods for healthy communities, acknowledging how important urban typologies are for a sense of safety, belonging and social vibrancy in urban environments. Moreover, 'location' seems to be the main factor attracting individuals to an urban neighbourhood, even when compared with job availability (Florida, 2002).

On the above evidence, it is clear that the three domains influence a place's desirability and can counteract or mitigate de-densification processes. However, few studies have tested scenario preferences based on these factors with residents and non-residents of depopulating urban environments, testing their relative importance. Such an approach could give a better understanding of what factors are perceived as having more impact in the environmental quality of neighbourhoods and, arguably, in people's quality of life, health and wellbeing.

2.5 Case Study: Lisbon, Portugal

Lisbon was chosen as a case study based on EU Urban Audit data where, between 1999-2004, Lisbon's core city had the greatest population loss among European cities with 500,000-999,000

inhabitants (Figure 1). Urban Audit has published more comparative data since then which show that Lisbon still features in the top 10 large European cities that experienced population loss between 2010 and 2013 (data from: http://ec.europa.eu/eurostat/web/cities/data/database. Timeframe 2010/2013). Furthermore, local data show that the population density of the city has decreased from 6656 inhabit/Km2 in 2001 to 5,044 inhabit/Km2 in 2016 (data from: https://www.pordata.pt/DB/Municipios/Ambiente+de+Consulta/Tabela).

Population shrinkage in Lisbon has been accompanied by an increased number of unoccupied households. It is estimated that, in 2011, the number of vacant buildings in Lisbon's regional area (NUT II) was 12,4% (Anon, 2012), whereas in 1981 was around 5% (Anon, 2008). However, the high urban density, and its historical value, has meant a high resistance to demolitions.

Fig. 1. Lisbon's Shrinking Neighbourhoods between 1981 and 2011. Data from *Statistics Portugal*

3. Aims and research questions

The aim of this research is to better understand which urban environmental attributes are understood by residents of depopulating neighbourhoods as having potentially greater impact on their perceived wellbeing, compared with residents of neighbourhoods with growing populations and with those seeking to move residence. As a sub-aim, this study also sought to understand which attributes might be more effective in counteracting depopulation by retaining existing residents and attracting new ones.

The environmental attributes are measured according to *decision utility* values, meaning "the utility signal used at the point of choice to guide decisions about future actions" (Berridge and O'Doherty, 2013, p.339). The varied population groups ('dwelling groups') were chosen in order to help clarify what are the more influential attributes in attracting new residents and retaining existing ones in a depopulating city, by exploring how depopulation can affect perceptions of, and preferences in relation to, hypothetical residential environments. The research questions which arise from this consider what the vectors of change are that will drive preferences in relation to a particular hypothetical urban context and whether they are consistent with the factors that are known to enhance wellbeing. The findings which relate to these preferences can also inform policy and practice so that urban authorities and planners can respond more appropriately to current residents' needs, and to potential new residents' desires.

To address these aims, three "dwelling" groups of participants were tested: residents of depopulating neighbourhoods, residents of neighbourhoods with growing populations, and house buyers. Based on the assumption that demographic variables are likely to influence people's choices, factors like age, presence of children in the household, gender and education levels were also considered.

4. Methods

4.1. Conjoint analysis

The method used in this research – conjoint analysis - is based on the presentation of hypothetical scenarios/concepts, allowing the exploration of the attributes that have more weight in choice-making (Aspinall *et al.*, 2010a) – *decision utility*. In the case of this study these scenarios/concepts describe urban environments. Rather than predicting outcomes, this approach considers plausible future possibilities in order to test decision-making, and it has been used successfully to build relationships about evidence between academics, technical experts and decision makers. Conjoint analysis presents participants with pre-determined fixed scenarios, closer to real life choices than considering each attribute in turn (Sattler and Hensel-Borner, 2003), therefore enabling the extraction of greater relevant information from respondents' answers than Likert scales, or other self-explicated methods. One of the contingencies of *decision utility* is that respondents are typically inconsistent in their choices (Kahneman and Krueger, 2014). To address this limitation, the conjoint analysis questionnaire asks the respondents for repeated tasks of the same nature to test the most common preferences, even amid response inconsistencies, instead of relying on one task only. This method, has been extensively used in marketing research, as well as in environmental psychology (Aspinall et al., 2007; Alves et al., 2008; Aspinall et al., 2010), and is now recommended by the UK's National Institute for Clinical Excellence (now renamed National Institute for Health and Care Excellence) to understand patients' preferences regarding different treatment options (Ryan, 2004; Aspinall et al., 2007).

Conjoint analysis is a mathematical method developed to compare "arbitrary combinations of 'quantities' of a single specified kind" (Luce, Tukey, 1964, p.1). It is a tool designed to calculate the relevance of different qualities, or attributes, of services, objects or products, when within a

combined agglomeration, as in real life, where trade-offs have to be made. Luce, a psychologist, and Tukey, a statistician, first developed conjoint analysis in 1964. Used initially as a marketing research technique by Green & Rao (1971) and Johnson (1974), it became popular in many different fields, including health, education and planning, because of its effective prediction.

Despite the popularity of conjoint analysis, some studies postulate that, when the object of analysis is too complex, i.e., when a large number of attributes need to be tested, there is no advantage in using it over self-explicated methods (SEMs). SEMs are compositional approaches, meaning that respondents consider each attribute separately in interviews or via questionnaires (Sambandam, n.d.).

Conjoint analysis is inversely structured, i.e., the relevant attributes are artificially combined to form potential scenarios presented to respondents in sets of two, three or four concepts – as might occur in real life – a decompositional approach. From participants' choices of the preferred scenario/concept, the relative importance of each attribute can be calculated in relation to the overall attributes that make up each study (Sambandam, n.d.).

The level of decompositionality differs within conjoint sub/methodologies; however, the latest version of conjoint, **A**daptive **C**hoice-**B**ased **C**onjoint or ACBC, combines the strengths of both compositional and decompositional approaches and for this reason it was chosen as the most appropriate sub-method for this study. Sawtooth, Ltd granted a free academic license for the use of software which allowed the study to be performed. Among the numerous advantages of ACBC is the identification of the non-compensatory attributes, i.e., attributes that a respondent is not willing to trade off with any other, helping to provide more accurate predictions by deepening the analysis of the remaining attributes. As a computer-based questionnaire, it tailors the questions while the participant is answering them, extracting more detailed information as the questionnaire

completion progresses (Curry, 1996; Johnson & Orme, 2007; Orme & Johnson, 2008). Even though, on average, an ACBC questionnaire takes more time to complete compared with the previous conjoint versions, it provides more accurate results by tailoring the scenarios (concepts) to an ideal situation and therefore eliminating automatic type of answers based on the identification of characteristics that quickly trigger a rejection. To do so, this method asks respondents for what would be an ideal scenario, plus asking directly what would be "must-have" and "unacceptable" criteria.

The main outputs of conjoint are 'relative importances' of attributes, equivalent to the range of utility values between different levels of an attribute. Utility is a measure representing the willingness to choose a certain level of an attribute and the average importance of an attribute indicates its relative importance throughout the sample, always adding up to 100, meaning that they are relative figures. The choice of attributes in a study, and their levels, is thus crucial to the final outputs of a conjoint study (Orme, 2010).

In this research, the set of attributes was firstly developed based on the three domains presented in the introduction (D1, D2 and D3), and in issues arising from preliminary focus groups with residents of depopulating neighbourhoods in Lisbon. In these discussions, the themes of *community* and *security* were dominant themes when residents were asked open-ended questions on their likes and dislikes of living in their neighbourhood. These dominant themes reinforced some of the concerns explicit in the literature presented in the first sections of this paper. No particular theme was mentioned or prompted to residents so that the responses would not be influenced by the research interests. The samples were selected by place of residency, age group, education level, and male/female equity and respondents were mainly recruited via local authorities and organisations in a total of nine sessions.

The final set of variables studied encompass six attributes, namely: '*urban typology*' (UT) – D2; '*population density*' (PD) – D2; '*open/green spaces type'* (OGST) – D3; '*open/green space quality*' (OGSQ) – D2&3; '*community*' (COMM) – D1 and focus groups - and '*security*' (SEC) – D2 and focus groups.

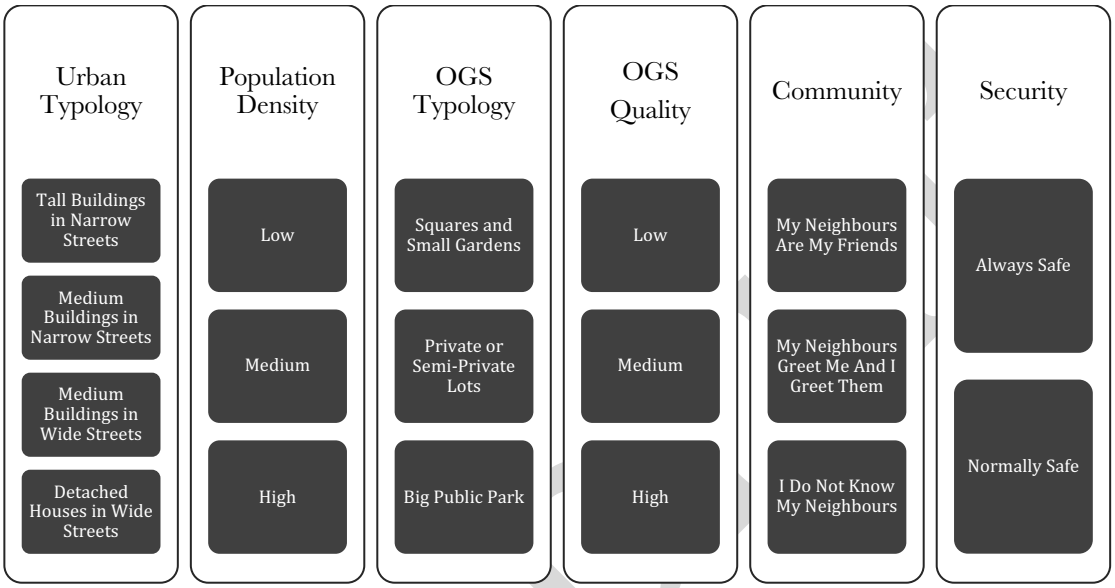

Fig. 2. List of attributes and levels.

For each of these attributes, a series of 'levels', or possible states within each attribute, was determined based on the findings of the preliminary focus groups and the variations that each attribute normally has in the context under study (Figure 2). In the focus groups, residents were asked open-ended questions about the qualities of their neighbourhood, for example, what did they enjoy the most and least about them. The aim was to understand what affected people's subjective perspective of their living environments. Three discussion groups were held in each neighbourhood, made up of the following age groups: 25-45 and 45-65 year olds; and over 65 year olds. The participants were invited through local authorities, specifically via the staff of the civil parishes, since the researchers had no links with these communities at the beginning of the study. This highlights a limitation of the study since it must be acknowledged that some biased selection

of participants may have occurred. Each discussion was sound recorded, with the agreement of the participants, and subsequently transcribed and analysed using the research software *NVivo*, designed for qualitative analyses. Analysis of the data was done thematically and divided into positive and negative mentions, i.e., there was a distinction between the themes that were mentioned as advantageous, or, viewed as disadvantageous, using the definition of a theme as set out by King and Horrocks, experts in qualitative research (2010).

The results from the focus groups showed that *security* was the most important theme, and *community & politics* came second. Other studies corroborate the fact that *security* is one of the most important attributes when considering a place to live (Nilsson et al., 2013), indicating that a lack of security is a 'non-tradable' characteristic. Respondents were unlikely to be prepared to choose a living environment, however attractive its other characteristics were, if this also meant tolerating a lack of security. For this reason, within the conjoint analysis, the attribute *security* was never described negatively, in order to avoid an excessive effect on the results which might overshadow and mask significant differences in the other attributes.

With regard to the attribute *urban typology*, since it would be impossible to present participants with all the different potential urban typologies possible, this was reduced to only four levels, reflecting alternative densities of built form. Traditionally, there was a correlation between urban typologies, built form density and population density in cities but, since the urban shrinkage phenomenon is precisely the cause for a lack of correlation between urban density and population density, these two attributes are presented separately in this study.

4.2. Choice of study sites

The study was undertaken between 2013 and 2014, and examined three core neighbourhoods in Lisbon, the Portuguese capital city. Two of them have had population losses of about 40% in the last three decades, and one regained 20% of its residents between 2001 and 2011.

Like most western cities, during industrialisation, Lisbon grew in population and later sprawled in area at unprecedented rates. However, by the beginning of the 21st century, Lisbon's core city had experienced a sharp population loss due to suburbanisation. This was considered a positive outcome since it meant better housing conditions for increasing numbers of citizens and less overcrowding in the historical neighbourhoods. Lisbon's metropolitan area continued its population growth until 2001; however, the preliminary results of the 2011 Portuguese national census and a more recent comparison of population numbers for the years 2011-13, showed a decline in the overall residential population of Lisbon's metropolitan area of about 35,000 people. This trend, although modest, showed the beginning of a declining trend, probably due to immigration flows ceasing, and to a new wave of emigration during the recent years of economic austerity.

Two neighbourhoods were chosen at the start of the study, in 2013, to represent the depopulating neighbourhoods – *São Paulo* and *Santo Estevão* – based on their rates of shrinkage and urban dereliction and due to their similar socio-economic profiles, overwhelmingly characterised by older and poorly educated residents (pordata.com). A third neighbourhood was chosen to represent a growing neighbourhood – *Socorro* – which borders *Santo Estevão,* and is close to *São Paulo* (Fig. 3 and 4).

Fig. 3 and 4. *São Paulo* Neighbourhood / *Boavista* street, Lisbon, Portugal, 2014, digital images. ©M.Francisca Lima

The neighbourhoods have similar urban typologies and social profiles, characterized by dense and sinuous urban fabrics, with medium-sized tenements, inhabited by working-class residents with low levels of education. The neighbourhood of *Socorro* (Fig. 5-6), however, had undergone a slight gentrification process over the past decade, having increased its population by 20% from 2001 to 2011.

Fig. 5 and 6. *Socorro* Neighbourhood / *Largo da Severa* and *Escadinhas de São Cristóvão* respectively, Lisbon, Portugal, 2014, digital images. ©M.Francisca Lima

All three neighbourhoods are well served by transport and attracted tourism at the time of the data collection in 2014. Since then, the city has witnessed a very sharp increase in the touristic demand, increasing short term rental offers and contributing to soaring real estate valuations (Barata-Salgueiro, Mendes and Guimarães, 2017; Lestegás, 2019). Such demands put at risk a deeper process of depopulation and community fragmentation already witnessed in cities suffering from mass tourism for several decades such as Prague (Dumbrovská, 2017), with potential risks for the health of low-income residents (Mehdipanah *et al.*, 2018). It is also worth mentioning that the commercial activities in these core neighbourhoods of Lisbon are strongly dominated by nightlife enterprises known to imprint these urban contexts with a bohemian character. This fact deters a major occupation of these neighbourhoods by middle to highly educated professionals with higher wages, who instead continue to patronise more privileged neighbourhoods such as *Avenidas Novas, Estrela or Telheiras* (Ledo, 2014).

4.3. Questionnaire structure

ACBC is structured around three main tasks: the 'build your own section', the 'screening' section' (that allows for identification of 'must-have' attributes and 'unacceptable' scenarios), and finally, the 'choice-based' section. The last is the core of the method and the two previous sections feed into it by collecting preliminary information about participants' basic preferences in order to narrow down scenario options as the questionnaire completion progresses towards the ideal for each participant.

The first questionnaire design was tested in a pre-pilot phase with about 20 participants in Lisbon. This test was mainly focused on the fluidity of respondents' reading, their response time and the overall feasibility of the questionnaire; therefore, there were no concerns about groups of

participants, or dwelling neighbourhoods. These tests were not used for the analysis of the data collected in this study.

In the main study, it took participants about 12 minutes, on average, to complete the questionnaire, reduced to the minimum possible length without compromising the robustness of the test, following Sawtooth, Ltd's technical advice.

The questionnaire was structured as follows:

(0) Demographic and individual data – the dwelling location of each participant (residents of declining neighbourhoods, residents of growing neighbourhoods and house-buyers), gender, age, education level and household composition.

(1) 'Build Your Own' Section (BYO) – asked respondents to 'build' their perfect hypothetical neighbourhood by choosing one level per attribute: "*Imagine now that it would be possible to build an ideal neighbourhood to live in. What would that neighbourhood be like? Please choose one of the levels of attributes presented and build the neighbourhood of your dreams.*" The section consisted of only four of the six attributes, since two attributes presented a ranked nature – '*open/green space quality*' and '*security*' – meaning that the answers to those questions would be known *a priori*.

(2) The Screening task asked participants to indicate if a particular scenario for a hypothetical neighbourhood would be considered: "*Each column represents a hypothetical neighbourhood. Would you consider living in any of these neighbourhoods?"* Each task presented three different concepts and the respondent indicated either "*It is a possibility*" or "*It wouldn't work for me*" against each neighbourhood description. During this task, the software detects patterns of choice; for example, if a participant always selects the option, "*It wouldn't work for me*" for a concept where the attribute *security* is described as "*usually safe*", the software will ask if that attribute is

"*totally unacceptable*". If it is, the software will exclude it from the future concepts presented (see below). The opposite also applies: if the presence of a particular level indicates a positive answer, then the software asks the participants if they find those levels indispensable - '*must-have*' question.

(3) Choice-Based Task – participants were presented with a series of scenarios, in each of which they had to choose one of three options presented - three concepts - and were asked: "In which of the neighbourhoods presented below would you prefer to live? Please consider that any other equally relevant characteristics that are not present in this study would be equal." The concepts presented were already very near the ideal for each participant, which meant the software could test which levels were more easily traded for others. Because most attributes presented were not related to aspects such as size of objects or people, which is particularly sensitive to the image processing brain system (Paivio, 1991), all attributes were presented through written descriptions rather than images.

This research design was ethically reviewed and approved by the University of Edinburgh.

4.4. Sampling and data collection

The data collection for the conjoint study aimed to achieve a balanced sample by gender, age and dwelling contexts in order to be as representative as possible of each neighbourhood under survey (Table 1). Most participants were recruited in small squares or cafés, or via civic associations and churches. Because the target population for this study was, in general, of a low educational background and socio-economic status, and the survey required access to a computer, this meant that most participants had to complete the questionnaires with assistance, and the questionnaire was read aloud when necessary.

Over the course of the survey, bonds were created between some key members of the study communities, which helped to reach many more participants during data collection. In depopulating neighbourhoods, this informal process of recruiting participants was less efficient, indicative of some level of community disruption.

Dwelling Group				**Education**		
	Frequency	**Percent**			**Frequency**	**Percent**
depopulating Neighbourhoods	49	38		basic	51	39
growing Neighbourhoods	44	34		intermediate	25	19
house Searchers	37	29		higher	54	42
Total	130	100		**Total**	130	100
Age Group				**Children in Household (Y/N)**		
	Frequency	**Percent**			**Frequency**	**Percent**
25/44	64	49		with no children in household	97	75
45/64	35	27		with children in household	33	25
65+	31	24		**Total**	130	100
Total	130	100				

Table 1. Sample overview by demographic characteristics.

Comparison between population and sample					
	Male	**Female**	**25/45**	**45/65**	**65+**
São Paulo					
population (%)	45.27	54.73	26.44	25.93	24.74
sample (%)	47.62	52.38	28.57	38.10	33.33
Difference between population and sample	-2.35	2.35	-2.13	-12.17	-8.60
Santo Estevão					
population (%)	42.15	57.85	22.03	26.43	30.58
sample (%)	53.57	46.43	32.14	35.71	32.14
Difference between population and sample	-11.42	11.42	-10.11	-9.29	-1.56
Socorro					
population (%)	44.17	55.83	24.41	27.25	25.94
sample (%)	45.45	54.55	36.36	36.36	31.82
Difference between population and sample	-1.28	1.28	-11.95	-9.11	-5.87
Mean of Difference in all three neighbourhoods	-5.02	5.02	-8.06	-10.19	-5.34

Table 2. Comparison between population and sample characteristics. *São Paulo (n=21)* and *Santo Estevão (n=28)* - shrinking neighbourhoods; *Socorro (n=44)* – growing neighbourhood.

Table 2 shows that respondents between the ages of 45-65 were under-represented in the sample, leading to a slight imbalance in the sample when compared to the population. Age was controlled to ensure any age-relevant responses did not unduly influence the results. With regard to the third 'dwelling' category of respondents, it was difficult to recruit house-buyers to take part in the questionnaire. There was no information regarding the overall population of house-buyers *a priori*, so the sampling method was closer to a snowball process. A snowball sampling relies, firstly, on a convenient sample that then is enlarged in further waves of recruitment (Heckathorn, 2011). The sample achieved was quite homogenous, with most participants coming from a comparatively high socio-economic stratum of the population, which is coherent with the conditions present at the data collection period, when banks strongly restricted access to mortgages (table 3). The analysis of the results needs to consider that house-searchers have declared their capacity to make a choice in housing, whereas the others groups did not. However, it is important to clarify that the question being asked of all participants was hypothetical, meaning that participants were asked to declare which ideal scenario would they choose if they could. Moreover, the analyses of this study controlled for demographic data, including education levels that are considered a proxy for average wages in Portugal, as corroborated by the statistical data on average wages per education level (pordata.pt).

House searchers						
Education level				**Number of household members**		
	Frequency	**Percent**			**Frequency**	**Percent**
basic	0	0		alone	9	24
intermediate	6	16		2	20	54
higher	31	84		3	6	16
total	**37**	**100**		4	1	3
				5 or more	1	3
				total	**37**	**100**
Gender				**Children in Household (Y/N)**		
	Frequency	**Percent**			**Frequency**	**Percent**
male	17	46		with	22	59
female	20	54		whithout	15	41
total	**37**	**100**		**total**	**37**	**100**

Table 3. Detailed overview of the house buyers' sample.

With regard to the sample sizes, for ACBC studies it is possible to achieve reliable results with one third of the sample needed for a CBC study (Jervis et al., 2012). Each cluster of research interest in this study – dwelling contexts – had a minimum sample of n=37 (house buyer) respondents, above the one-third threshold of a normal sample size required for a conjoint study: nta/c > 500 where, n=number of respondents t=number of tasks a=concepts per task c=largest number of levels per one attribute).

4.5 Data analysis

The differences in the average of the importance and utility values of the attributes, and levels of attributes respectively, were analysed by dwelling groups and other demographic factors first, using non-parametric tests like Mann Whitney and Jonckheere tests and, when needed, a Bonferroni correction. Regressions and binary logistics were then undertaken to test if the dwelling context variable was statistically significant when compared with other differences in the sample.

5. Results

5.1 Attribute importance across the whole sample

Across the whole sample, the results show that, of the six attributes, *urban typology* and *community* are the most important, meaning that they were the most relevant attributes in the trade-off process, i.e., present a wider difference between utility values for each level. The attributes *population density*, *open/green space type*, and *open/green space quality* (OGSQ) were placed equally in third place and the attribute *security* (as represented by the levels chosen for the ACBC

analysis, all representing relatively positive levels of security) had the lowest importance score (Figure 2).

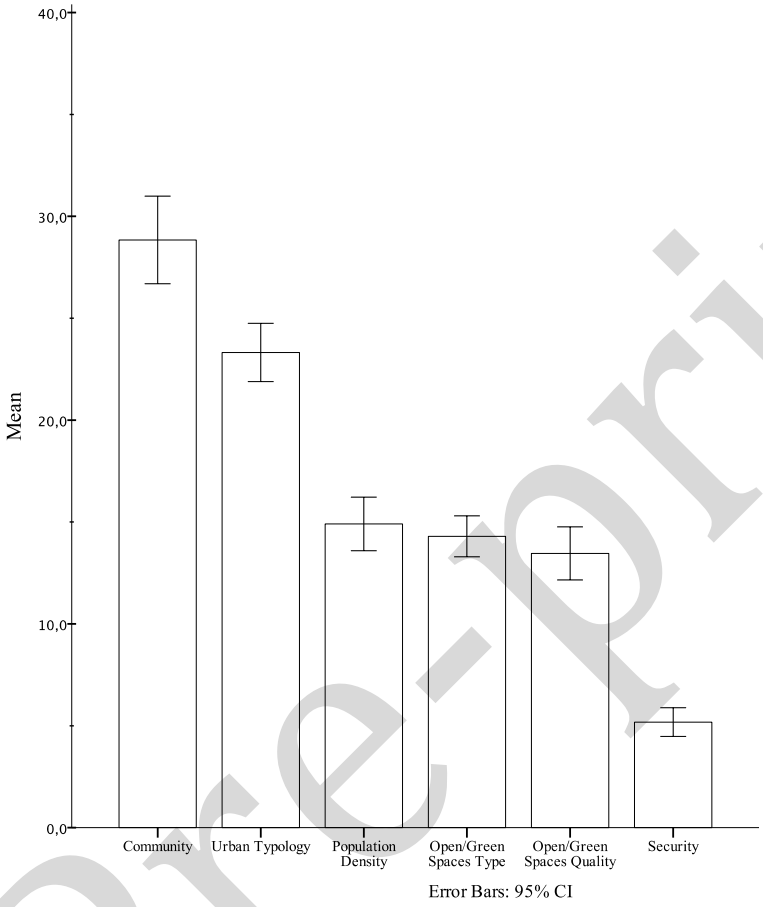

Figure 7. The average relative importance of each attribute, whole sample (n=130)

Of the six attributes, the ones that contributed more to the process of choice-making were *urban typology* and *community,* since they show a higher difference between the mean utilities of their different levels, i.e. are the most important attributes. As discussed earlier, importances in an ACBC study represent the range between the most and least valued utility levels within one attribute. Although these values are relative and always sum 100 across attributes, they are critical

to a better understanding of the weight that each attribute has in decision-making within a set of attributes. If other attributes were chosen, the relative balance would change, but since they were chosen based on the research hypothesis and the preliminary qualitative work, they were considered appropriate for this particular study.

5.2 The effect of individual demographics

The results of this study show that differences in gender do not affect preferences (Table 2), however, the presence of children in the household do. For example, the attribute *'open and green space quality'* was significantly more important for participants living with children (Table 3).

Gender		**Urban Typology**	**Population Density**	**Open/Green Space Type**	**Open/Green Space Quality**	**Community**	**Security**
Mean Ranks	male (N=62)	65.76	61.76	63.45	64.16	70.29	67.69
	female (N=68)	65.26	68.91	67.37	66.72	61.13	63.50
Median	male (N=62)	22.65	12.60	13.37	11.83	31.41	4.80
	female (N=68)	21.58	14.28	14.03	12.62	27.10	4.19
Mann Whitney U		2092	1876	1981	2025	1811	1972
Z		-0.08	-1.08	-0.59	-0.39	-1.38	-0.63
r (Z/√N)		0.00	-0.06	-0.04	-0.02	-0.08	-0.04
Sig. 2 tailed		0.94	0.28	0.55	0.70	0.17	0.53

Table. 4. Non-parametric tests showing non-significant differences in gender across all attributes.

Children in the household		**Urban Typology**	**Population Density**	**Open/Green Space Type**	**Open/Green Space Quality**	**Community**	**Security**
Mean Rank	without (N=97)	63.85	62.99	66.44	61.32	68.93	64.81
	with (N=33)	70.36	72.88	62.73	77.79	55.42	67.52
Median	without (N=97)	21.01	12.64	14.01	11.66	31.85	4.52
	with (N=33)	23.04	13.84	12.80	15.50	23.84	4.31
Mann Whitney U		1440	1357	1509	1195	1268	1534
Z		-0.86	-1.30	-0.49	-2.17	-1.78	-0.36
r (Z/√N)		-0.05	-0.08	-0.03	-0.13	-0.11	-0.02
Sig. 2 tailed		0.39	0.19	0.63	**0.03**	0.08	0.72

Table 5. Non-parametric tests showing a significant difference in the attribute '*open and green spaces' quality*' in respondents with children in their household.

Preferences varied significantly by age: older participants valued the attribute *community* significantly more, and the attributes *open/green space quality* and *population density* significantly less than younger people.

With regard to education, the Jonckheere test revealed that more educated participants give a higher average importance to *open/green space quality*, and a lower average importance to *community*. The attribute *population density* was also significantly more important to participants with higher education compared to those with only basic education.

Age		**Urban Typology**	**Population Density**	**Open/Green Space Type**	**Open/Green Space Quality**	**Community**	**Security**
Mean Ranks	25-44 (N=64)	66.11	72.79	70.28	78.66	51.22	66.08
	45-65 (N=35)	62.89	73.63	52.49	58.91	72.54	69.97
	65+ (N=31)	67.19	41.27	70.32	45.77	87.03	59.26
Chi-Square (H)	*(df=2)*	0.25	16.85	5.72	17.38	20.55	1.36
Sig.		0.88	**0.00**	0.06	**0.00**	**0.00**	0.51
Jonckheere (J)		2655.00	1933.50	2498.00	1700.00	3718.00	2529.00
z (St J-T test)		0.00	-3.16	-0.69	-4.18	4.66	-0.55
r Jonckheere		0.00	-0.28	-0.06	-0.37	0.41	-0.05
Sig. 2 tailed		1.00	**0.00**	0.49	**0.00**	**0.00**	0.58

Education		**Urban Typology**	**Population Density**	**Open/Green Space Type**	**Open/Green Space Quality**	**Community**	**Security**
Mean Ranks	basic (N=51)	63.25	53.91	64.57	53.65	81.33	66.73
	interme. (N=25)	60.56	71.98	63.72	63.20	64.08	68.44
	higher (N=54)	69.91	73.44	67.20	77.76	51.20	62.98
Chi-Square (H)		1.35	7.97	0.20	10.86	16.82	0.45
Sig.		0.51	**0.02**	0.91	**0.00**	**0.00**	0.80
Jonckheere (J)		2909.00	3295.50	2780.00	3454.00	1740.00	2564.00
z (St J-T test)		0.95	2.63	0.39	3.32	-4.13	-0.55
r Jonckheere		0.08	0.23	0.03	0.29	-0.36	-0.05
Sig. 2 tailed		0.34	**0.01**	0.69	**0.00**	**0.00**	0.59

Table 6. Non-parametric tests on age and education.

5.3 The effect of depopulation: differences between dwelling groups

Participants from the three different dwelling groups – depopulating neighbourhoods, growing neighbourhood and house buyers – differed significantly in the importance given to the attributes *community*, *population density* and *open/green space quality* (Table 2). A series of Mann-Whitney tests, using the Bonferroni correction, showed that the attribute *community* was significantly more

important for participants living in depopulating neighbourhoods than for those living in growing neighbourhoods. *Population density* was less important for residents of depopulating neighbourhoods than of growing neighbourhoods and house buyers. And *open/green space quality* was significantly more important to house buyers when compared to the other dwelling groups (Table 5 and Figure 8).

Dwelling Group		**Urban Typology**	**Population Density**	**Open/Green Space Type**	**Open/Green Space Quality**	**Community**	**Security**
Mean Rank	depop. (N=49)	64.35	52.00	59.43	53.67	83.31	65.04
	grow. (N=44)	66.14	74.55	69.91	59.82	61.41	62.89
	house buyers (N=	66.27	72.62	68.30	87.92	46.78	69.22
Chi-Square (H)	*(df=2)*	0.07	10.15	2.08	18.93	20.60	0.58
Sig.		0.96	**0.01**	0.35	**0.00**	**0.00**	0.75
Jonckheere (J)		2864.00	3438.00	3074.00	3716.00	1733.00	2897.00
z (St J-T test)		0.28	2.74	1.18	3.93	-4.57	0.42
r Jonckheere		0.02	0.24	0.10	0.34	-0.40	0.04
Sig. 2 tailed		0.78	**0.01**	0.24	**0.00**	**0.00**	0.67

Table 7. Non-parametric tests on dwelling groups.

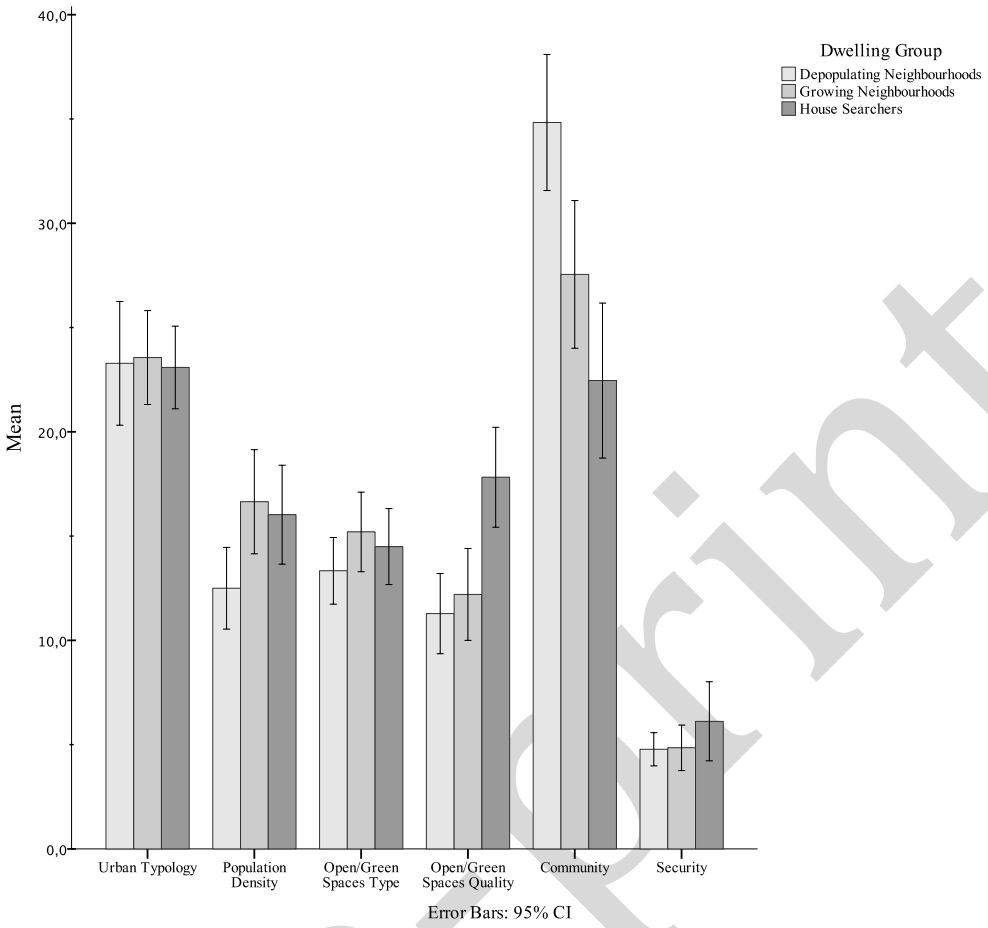

Figure 8. Attributes' importance, by dwelling group, for the whole sample (n=130).

The importance of the attributes *urban typology*, *open/green space type*, and *security* were not significantly different across the three sub-groups. However, the relative importance of the attribute *community* differed and was therefore further tested in a multiple regression comparing residents of depopulating against growing neighbourhoods (the variable *community* follows a normal distribution p= 0,20 Kolmogorov-Smirnov). After controlling for the variables age, education and the presence of children in a household, the attribute *community* was still significantly different between residents of depopulating *versus* growing neighbourhoods β= -0,32, p= 0,00. (see Table 6).

Step 1	**B**	**SE**	**β**
Constant	26,72	5,66	
Age Group	3,83	1,77	**0,26***
Education	-1,76	1,62	-0,12
Children	0,22	3,24	0,01

Step 2	**B**	**SE**	**β**
Constant	40,56	6,84	
Age Group	3,12	1,7	**0,21***
Education	-2,43	1,55	-0,17
Children	-0,85	3,1	0,03
Depopulation	-7,52	2,3	**.-0,32***

Note: R^2 = 0,19 for step 1, ΔR2= 0,05 for step 2, (*ps* < 0.05). * *p*< 0.05, ***p*< 0.01, ****p*< 0.001.

Table 8. Multiple regression for the importance of the attribute *community* (n=93).

A comparison between the utilities of the three levels of the attribute *community* shows that the level *neighbours as friends* was significantly higher for residents living in depopulating neighbourhoods and that the level *neighbours as strangers* was significantly lower for this same group when compared with the other two (see Figure 9).

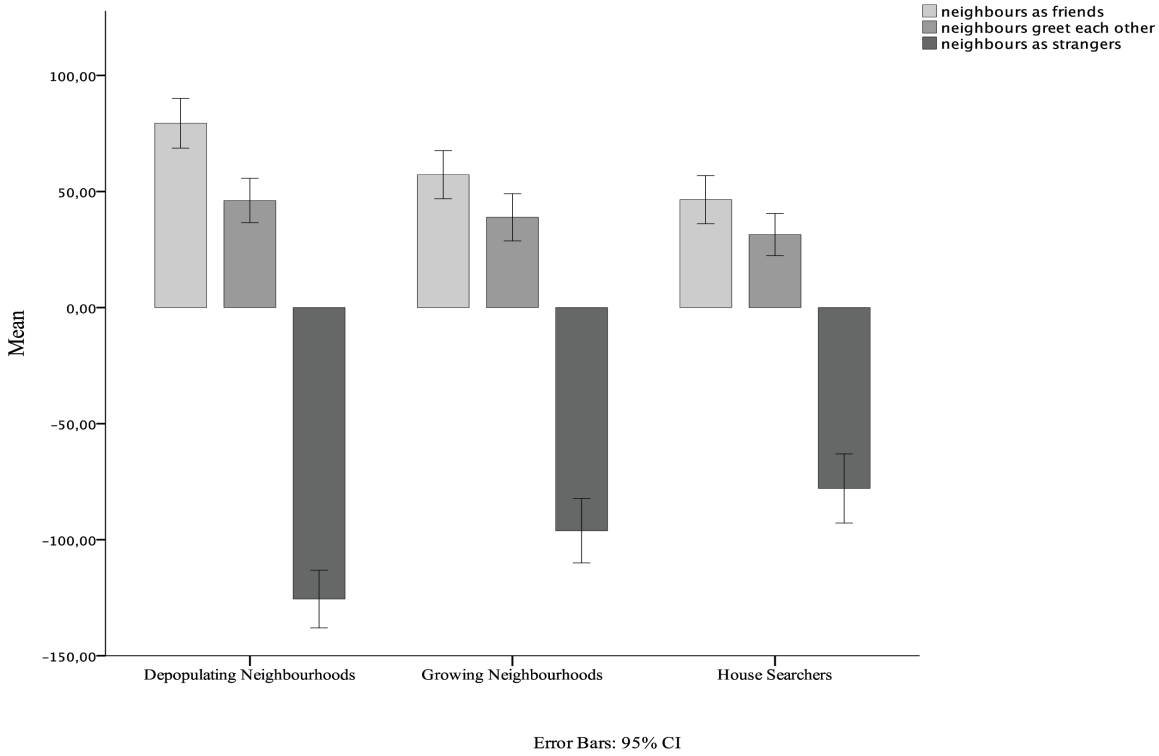

Figure 9. Utilities across the levels of the attribute *community* by dwelling group.

Figure 9 illustrates that the most significant change between levels within the attribute *community* is from having *neighbours as strangers* to having *neighbours that greet each other*, indicating that respondents strongly avoid the former, more extreme level of isolation.

The variable *population density* was also significantly different for participants in the depopulating and growing neighbourhoods (Figure 10). Since this variable was not normally distributed, a binary logistic regression was developed. The results show that the importance given to *population density* is significantly lower for participants living in depopulating neighbourhoods. This difference is due, mainly, to a less negative evaluation of the level *high population density* (Table 7). Consistent across all groups is the fact that both high and low population densities were negatively assessed and that a medium density level is preferred across all groups of respondents.

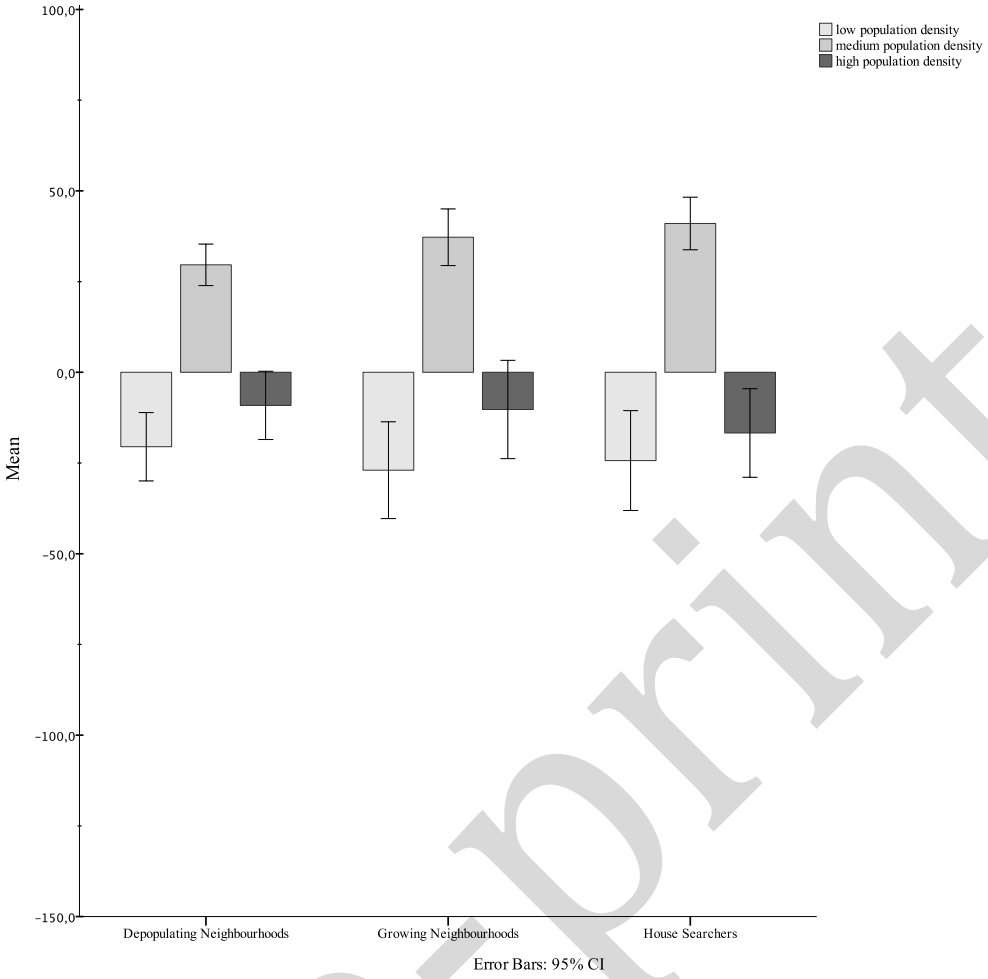

Figure 10. Utilities across the three levels of the attribute *population density* by dwelling group

	B (SE)	95% CI for Odds Ratio Lower	Odds Ratio	Upper
Importance of the attribute Population Density	**0,08* (0,03)**	1,02	1,08	1,15
Constant	. -1,23 (0,5)			

Note: *R2*=0,073 (Cox & Snell), 0,098 (Nagelkerke). Model *X2* (1)= 7,09, *p < 0,05

	B (SE)	95% CI for Odds Ratio Lower	Odds Ratio	Upper
Importance of the attribute Community	**.-0,04* (0,021)**	0,92	0,96	1,13
Importance of the attribute Population Density	0,05 (0,035)	0,98	1,05	1,00
Constant				

Note: *R2*=0,113 (Cox & Snell), 0,151 (Nagelkerke). Model *X2* (2)= 11,14, *p < 0,05

Table 9. Results of the binary logistic regressions testing *population density* alone and *population density* and *community* together (n=93).

However, when the variable *community* was added to the model, the attribute *population density* did not improve the regression (p=0,15), and only the variable *community* became a significant predictor of depopulation. These two attributes – *community* and *population density* – are significantly correlated (-.501 which is significant at p<0.01).

The attribute *open/green space quality* also does not follow a normal distribution, so a regression was not produced. However, non-parametric tests indicate a significantly higher importance given to the attribute *open/green spaces quality* by younger and more educated participants. Also, the utilities show that the level *low quality* of open/green space was more negatively assessed by house buyers (Figure 11).

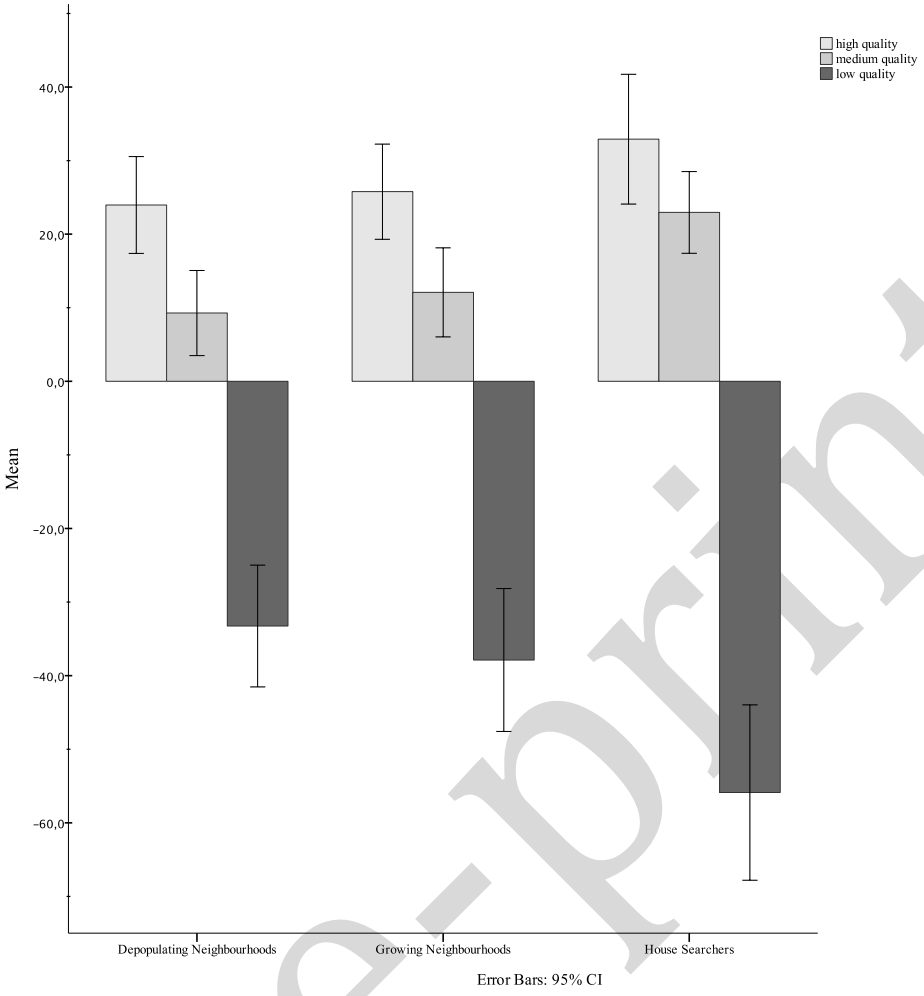

Figure 11. Utilities across levels for the attribute *open/green space quality* by dwelling group.

6. Discussion

The aims of this conjoint study were twofold. Primarily, we were interested in understanding which urban environmental attributes could be perceived as more impactful for wellbeing via a *decision utility* measurement, and if these are consistent with previous literature on urban environmental wellbeing conditions. Secondly, we wanted to know which attributes have greater potential for retaining existing residents of these neighbourhoods and attracting new ones, so that future urban interventions in these areas could be more targeted.

The results show that, for residents living in depopulating environments, the factor *community* is significantly more important than for those in other environments, as the residents show a greater preference for a friendlier network of neighbours. This result was confirmed after controlling for other possible influencing variables and the results indicate that depopulation alone can influence residents' preference for a community where neighbours are seen as friends. Also, residents of depopulating environments hold weaker negative views about high population densities compared to participants living in growing communities. However, when both *population density* and *community* were tested in the same model, only the latter accounted for differences in the two dwelling groups; being a friendlier community was the dominant preference for depopulating neighbourhoods' residents.

For house buyers, the factor *community* is less important than for the other two groups, but the *quality* of *open/green spaces* is significantly more important. These results indicate that to retain existing residents and attract new ones, two factors are particularly important, namely, the existence of a friendly community and having good quality green spaces.

The fact that communities in depopulating urban environments are, on average, inhabited by older residents of lower educational backgrounds, on lower wages and less mobile, means they are particularly reliant on the community in place (Fritsche *et al.*, 2007), whereas more mobile residents might have communities of reference that are not place based. Homogenous communities within unequal societies are known to be more affected by the lack of social capital, and in societies with stronger economic inequalities, the lack of appropriate social ties has a stronger impact on citizens' health and wellbeing (Kim, Subramanian and Kawachi, 2008). Resources made available to community members are certainly disrupted by sharp population shrinkage and it is understandable that, under these circumstances, people feel much more attracted to a friendly

neighbourhood community, even if socially homogenous. Depopulation is typically associated with social segregation and high unemployment rates and, in the neighbourhoods studied, characterised by older and less educated people. Although there is evidence that diversity is crucial to obtain good levels of social capital, high human density levels, per se, can be conducive to economic strength (Knudsen *et al.*, 2007). However, in many shrinking cities, demolition has been proposed, opening space for other uses but often leading to impoverished communities and economic instability. The results from this study show a less negative preference about high population density scenarios from respondents living in depopulating neighbourhoods, although a medium density scenario was consistently preferred in all three samples. For this reason, large-scale de-densification might not be advisable, unless it conserves compactness and community stability. This finding aligns with recent literature defending the benefits of 'compact cities' for sustainability and resilience (Ryan, 2012) and, more importantly, for walkability and healthy lifestyles. However, when considering not only the friendliness of a community, but also its diversity, it becomes crucial to consider what other factors may attract residents with different social, economic and educational backgrounds to these impoverished contexts. Interestingly, the attribute *open/green spaces' quality* was found to be more important for younger and more educated participants, especially those currently in search of a new house. This supports the view that open/green spaces of good quality can attract new residents, further enriching the community's diversity and hence, its social capital. Improving the attractiveness of a neighbourhood by investing in its green spaces can work in two ways to improve residents' levels of health: firstly, by providing direct access to restorative environments that can reduce stress levels and improve mental and physical health (Hartig et al. 2014; Ward Thompson et al. 2012; Mitchell 2012, Mitchell et al. 2011) and, secondly, by being a potential factor conducive to the diversification of

the established community. It is however important to consider that previous examples of greening strategies have cause neighbourhood gentrification and therefore renewed processes of social segregation (Anguelovski *et al.*, 2018).

The fact that the attribute *security* is ranked as the least important attribute seems closely linked to the fact that both levels within this attribute were presented positively. 'Security' was among the most important issues raised in the preliminary focus groups with residents of selected depopulating neighbourhoods in Lisbon, as mentioned earlier, and a negative level within the attribute *security* could have become a default reason for rejection by participants, overshadowing other attributes of importance. The results of the study must, therefore, be interpreted with this in mind, as *security* is probably of primary importance, as has been suggested by previous studies (Nilsson *et al.*, 2013), including in Lisbon (Panagopoulos, Guimarães and Barreira, 2015). It is, however, important to highlight that this conjoint study included a "must have" question, and that, even with this caveat, the attribute security was still the least important in the overall rank. It is possible that, either citizens are tolerant to moderate levels of insecurity, or that the levels of insecurity are not impacting citizens' daily life. An EU study on cities' quality of life has shown that perceptions of safety in Lisbon in 2013 were not among the highest in European capital cities, with the city being placed in number 22 out of the 28 European capital cities (European Commission. Regional and Urban Policy, 2013). A follow up study would be necessary to disentangle this effect.

Limitations of the study include the fact that house-buyers were recruited by a snow-ball process which limited the sample profile, dominated by younger participants with higher educational levels. However, the lending restrictions that the banks had imposed at the time of the study (2014) would have excluded low earners from access to mortgages, meaning that the sample

is coherent with the conditions of the time. Nonetheless, the statistical tests performed (non-parametric tests and multiple regressions) took into consideration the educational level, age, and gender of the participants in order to control for potential dominant parameters other than the ones being analysed, namely, dwelling groups; some of the statistical tests were performed only between the depopulating and growing neighbourhood samples; and all samples included representation by intermediate and higher education groups. Regarding age, the sample is slightly skewed due to the difficulty of recruiting participants in working ages. However, the age group was not a predictor of differences in preferences between the depopulating and growing contexts so we believe that a more balanced sample would probably have a limited effect on these results.

Another limitation to be recognised is the questionnaire's cognitive demand, relative to the educational background of most participants, which might have driven an oversimplification of the tasks. However, the data show good levels of coherence, namely, in the strong correlations found between levels such as detached housing and the existence of private gardens ($p=0.4$).

As a final note, it is also important to reinforce that, since 2014, the date when the study was performed, the situation in Lisbon has suffered alterations with a mass *touristification* of the city centre and what has been named a 'tourist-driven' gentrification processes (Lestegás, 2019) that imprints these neighbourhoods with strong population impermanence, potentially contributing to the community fragmentation processes already in place.

In summary, these results show consistency between respondents' preferences and environmental factors known to affect people's wellbeing and health in the cities as presented in the literature review, namely community proximity and trust (social capital), access to green/open spaces and medium levels of density conducive to social interaction and physical activity. However, stronger levels of community friendliness seem to be more important for the sample

living in a depopulating neighbourhood when compared to a growing neighbourhood and quality green spaces are more attractive to the sample searching for a house; since these preferences are contextually driven, they are relevant to future policy development.

7. Conclusion

The results of this study show that both the attributes 'community' and 'urban typology' are, overall, considered more important than other attributes explored with the participants. In particular, a 'friendly community' is perceived as the most important attribute for an urban environment conducive to a good and healthy lifestyle. It is therefore important to keep the levels of community disruption to a minimum in any intervention in depopulating neighbourhoods, since they are profoundly disturbing of communities' social capital.

Regarding the attributes that might impact the retention of current residents and the attraction of new ones, the results indicate that again the attribute 'community' is of top importance, particularly for current dwellers in the neighbourhood. A dense population is perceived comparatively less negatively perceived in depopulating neighbourhoods than in other contexts, therefore, de-densification scenarios are not likely to be considered a benefit by the local population.

Open/green spaces of good quality are particularly important in attracting new younger residents and therefore, might be potential assets to help improve these communities' social *bridging* capital, with consequences for their health and wellbeing via reduced levels of stress and access to more social or other resources. This last finding corroborates the link between good quality green spaces and rising real estate prices (Bolitzer and Netusil, 2000; Tyrväinen and Miettinen, 2000; Kong, Yin and Nakagoshi, 2007; Bark *et al.*, 2009; Hui, Zhong and Yu, 2012;

Roebeling *et al.*, 2017), particularly when of high quality (Panduro and Veie, 2013) and in dense urban settings (Anderson and West, 2006). Consistent with this finding is the use of green spaces as marketing tools in the real estate market (Maruani and Amit-Cohen, 2013). However, greening strategies need to be closely assessed and managed so that they do not foment green gentrification instead of selectively tackling vacancy, as discussed by Wolch, Byrne and Newell (2014) in what they entitle "The challenge of making cities 'just green enough". On this basis, a sparse and equitable distribution of good quality green spaces across all urban neighbourhoods should be taken into serious consideration.

In conclusion, to create greater stability and enhance depopulating urban contexts with a more diverse community, it is important not to neglect the existing community, i.e., the current social bonds, and simultaneously, to be aware that good quality green spaces are important assets for increasing the attractiveness of neighbourhoods, especially to create greater social diversity.

According with the theory of social capital, once, and if, a more diverse community is re-established, then the most vulnerable members of these communities will be part of a more resilient environment with improvements on their access to jobs, better quality of life, wellbeing and health.

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References

Abbott, S. and Freeth, D. (2008) 'Social capital and health: Starting to make sense of the role of generalized trust and reciprocity', *Journal of Health Psychology*, 13(7), pp. 874–883. doi: 10.1177/1359105308095060.

Albro, S. L., Burkholder, S. and Koonce, J. (2017) 'Mind the gap: tools for a parcel-based storm water management approach', *Landscape Research*. Routledge, 42(7), pp. 747–760. doi: 10.1080/01426397.2017.1363879.

Alves, S. *et al.* (2008) 'Preferences of older people for environmental attributes of local parks', *Facilities*, 26(11/12), pp. 433–453. doi: 10.1108/02632770810895705.

Anderson, S. T. and West, S. E. (2006) 'Open space, residential property values, and spatial context', *Regional Science and Urban Economics*, 36(6), pp. 773–789. doi: 10.1016/j.regsciurbeco.2006.03.007.

Anguelovski, I. *et al.* (2018) 'New scholarly pathways on green gentrification: What does the urban "green turn" mean and where is it going?', *Progress in Human Geography*, 43(6), pp. 1064–1086. doi: 10.1177/0309132518803799.

Aspinall, P. *et al.* (2007) 'Quality of life and relative importance: A comparison of time trade-off and conjoint analysis methods in patients with age-related macular degeneration', *British Journal of Ophthalmology*, 91(6), pp. 766–772. doi: 10.1136/bjo.2006.104679.

Aspinall, P. *et al.* (2010a) 'Preference and relative importance for environmental attributes of neighbourhood open space in older people', *Environment and Planning B: Planning and Design*, 37(6), pp. 1022–1039. doi: 10.1068/b36024.

Aspinall, P. *et al.* (2010b) 'Preference and relative importance for environmental attributes of neighbourhood open space in older people', *Environment and Planning B: Planning and Design*, 37(6), pp. 1022–1039. doi: 10.1068/b36024.

Audirac, I. (2018) 'Introduction: Shrinking Cities from marginal to mainstream: Views from North America and Europe', *Cities*, 75(October 2017), pp. 1–5. doi: 10.1016/j.cities.2017.10.012.

Barata-Salgueiro, T., Mendes, L. and Guimarães, P. (2017) 'Tourism and urban changes: Lessons from Lisbon', *Tourism and Gentrification in Contemporary Metropolises: International Perspectives*, (1989), pp. 255–275. doi: 10.4324/9781315629759.

Bark, R. H. *et al.* (2009) 'Habitat preservation and restoration: Do homebuyers have preferences for quality habitat?', *Ecological Economics*. Elsevier B.V., 68(5), pp. 1465–1475. doi: 10.1016/j.ecolecon.2008.10.005.

Berridge, K. C. and O'Doherty, J. P. (2013) *From Experienced Utility to Decision Utility*, *Neuroeconomics: Decision Making and the Brain: Second Edition*. Elsevier Inc. doi: 10.1016/B978-0-12-416008-8.00018-8.

Bini, P. C., Cortese, C. and Violante, A. (2011) *Shrink Smart. The Governance of Urban Shrinkage in Genoa*. Roma.

Blanco, H. *et al.* (2009) 'Shaken, shrinking, hot, impoverished and informal: Emerging research agendas in planning', *Progress in Planning*, 72(4), pp. 195–250. doi: 10.1016/j.progress.2009.09.001.

Bolitzer, B. and Netusil, N. R. (2000) 'The impact of open spaces on property values in Portland, Oregon', *Journal of Environmental Management*, 59(June 1998), pp. 185–193. doi: 10.1006/jema.2000.0351.

Brimblecombe, N., Dorling, D. and Shaw, M. (2000) 'Migration and geographical inequalities in health in Britain.', *Social science & medicine (1982)*, 50(6), pp. 861–78. Available at: http://www.ncbi.nlm.nih.gov/pubmed/10695983.

Cattell, V. (2001) 'Poor people, poor places, and poor health: The mediating role of social networks and social capital', *Social Science & Medicine*, 52, pp. 1501–1516. doi: 10.1016/S0277-9536(00)00259-8.

Census 2011 Resultados Definitivos - Região Lisboa (2012). Lisboa.

Chen, X. *et al.* (2014) 'Measuring Social Capital Investment: Scale Development and Examination of Links to Social Capital and Perceived Stress', *Social Indicators Research*, 120(3), pp. 669–687. doi: 10.1007/s11205-014-0611-0.

Cortese, C. *et al.* (2013) 'Governing Social Cohesion in Shrinking Cities: The Cases of Ostrava, Genoa and Leipzig', *European Planning Studies*, 22(10), pp. 2050–2066. doi: 10.1080/09654313.2013.817540.

Curry, J. (1996) *Sawtooth Software Understanding Conjoint Analysis in 15 minutes*, *Quirk's Marketing Research Review*. Available at: http://www.sawtoothsoftware.com/support/technical-papers/general-conjoint-analysis/understanding-conjoint-analysis-in-15-minutes-1996.

Diez Roux, A. V. (2016) 'Neighborhoods and health: What do we know? what should we do?', *American Journal of Public Health*, 106(3), pp. 430–431. doi: 10.2105/AJPH.2016.303064.

Dumbrovská, V. (2017) 'Urban Tourism development in Prague: From Tourist Mecca to Tourist Ghetto', in Fava, N. and Palou Rubio, S. (eds) *Tourism in the City*. Springer, pp. 275–285. doi: 10.1007/978-3-319-26877-4_20.

Dustmann, C. and Fasani, F. (2016) 'The Effect of Local Area Crime on Mental Health', *Economic Journal*, 126(593), pp. 978–1017. doi: 10.1111/ecoj.12205.

European Commission. Regional and Urban Policy (2013) 'Quality of life in cities. Perception survey in 79 European Cities. Flash Eurobarometer 366', (July), p. 151.

European Environmental Agency (2009) *Ensuring quality of life in Europe's cities and towns*. EEA (European Environment Agency) report no 5. Office for Official Publications of the EU, Luxembourg. doi: ISSN 1725-9177.

Florida, R. (2002) *The Rise of the Creative Class*. New York: Basic Books.

Florida, R., Mellander, C. and Stolarick, K. (2011) 'Beautiful Places: The Role of Perceived Aesthetic Beauty in Community Satisfaction', *Regional Studies*, 45(1), pp. 33–48. doi: 10.1080/00343404.2010.486784.

Frank, L. D. *et al.* (2005) 'Linking objectively measured physical activity with objectively measured urban form: Findings from SMARTRAQ', *American Journal of Preventive Medicine*, 28(2 SUPPL. 2), pp. 117–125. doi: 10.1016/j.amepre.2004.11.001.

Fritsche, M. *et al.* (2007) 'Shrinking Cities: A New Challenge for Research in Urban Ecology', in Langner, M. and Endlicher, W. (eds) *Shrinking Cities: Effects on Urban Ecology and Challenges for Urban Development*. Peter Lang, pp. 17–33. Available at: http://www.peterlang.com/index.cfm?vID=56610&vLang=D&vHR=1&vUR=2&vUUR=1.

Frumkin, H. (1974) 'Urban Sprawl and Public Health', *Public Health Reports*, 117(3), pp. 201–217.

Galea, Sandro *et al.* (2005) 'Urban built environment and depression: a multilevel analysis', *Journal of Epidemiol Community Health*, 59, pp. 822–827. doi: 10.1136/jech.2005.033084.

Glass, R. (1964) *London: Aspects of Change*. London: Macgibbon & Kee.

Guerra, I. and Mateus, A. (2008) *Contributos para o Plano Estratégico de Habitação: Políticas de Habitação: 2008-2013*. Lisbon.

Gulachenski, A. *et al.* (2016) 'Abandonment, ecological assembly and public health risks in counter-urbanizing cities', *Sustainability (Switzerland)*, 8(5), pp. 1–26. doi: 10.3390/su8050491.

Haase, D., Kabisch, N. and Haase, A. (2013) 'Endless Urban Growth? On the Mismatch of Population, Household and Urban Land Area Growth and Its Effects on the Urban Debate', *PLoS ONE*, 8(6), p. e66531. doi: 10.1371/journal.pone.0066531.

Haase, D. and Seppelt, R. (2008) 'Land use impacts of demographic change: lessons from eastern german urban regions', in Petrosillo, Irene; Murer, F. et al (ed.) *Use of Landscape Sciences for Assessment of Environmental Security*. Dordrecht, Netherlands: Springer, pp. 329–344.

Hartig, T. *et al.* (2014) 'Nature and health', *Annual Review of Public Health*, 35, pp. 207–228. doi: 10.1146/annurev-publhealth-032013-182443.

Heckathorn, D. D. (2011) 'Comment: Snowball versus respondent-driven sampling', *Sociological Methodology*, 41, pp. 355–366. doi: 10.1111/j.1467-9531.2011.01244.x.

Hennig, E. I. *et al.* (2015) 'Multi-scale analysis of urban sprawl in Europe: Towards a European de-sprawling strategy', *Land Use Policy*, 49, pp. 483–498. doi: 10.1016/j.landusepol.2015.08.001.

Hui, E. C. M., Zhong, J. W. and Yu, K. H. (2012) 'The impact of landscape views and storey levels on property prices', *Landscape and Urban Planning*. Elsevier B.V., 105(1–2), pp. 86–93. doi: 10.1016/j.landurbplan.2011.12.002.

Islam, M. K. *et al.* (2006) 'Social capital and health: Does egalitarianism matter? A literature review.', *International Journal for Equity in Health*, 5, p. 3. doi: 10.1186/1475-9276-5-3.

Ivory, V. C. *et al.* (2015) 'Could strength of exposure to the residential neighbourhood modify associations between walkability and physical activity?', *Social Science and Medicine*, 147, pp. 232–241. doi: 10.1016/j.socscimed.2015.10.053.

Jacobs, J. (1961) *The Death and Life of Great American Cities*. New York: The Modern Library.

Jay, K. and Andersen, L. L. (2018) 'Can high social capital at the workplace buffer against stress and musculoskeletal pain?: Cross-sectional study', *Medicine (United States)*, 97(12). doi: 10.1097/MD.0000000000010124.

Jervis, S. M., Ennis, J. M. and Drake, M. A. (2012) 'A Comparison of Adaptive Choice-Based Conjoint and Choice-Based Conjoint to Determine Key Choice Attributes of Sour Cream with Limited Sample Size', *Journal of Sensory Studies*, 27(6), pp. 451–462. doi: 10.1111/joss.12009.

Johnson, R. M. and Orme, B. K. (2007) *A New Approach to Adaptive CBC*, *2007*. Available at: https://www.sawtoothsoftware.com/support/technical-papers/adaptive-cbc-papers/a-new-approach-to-adaptive-cbc-2007.

Jones, C. and Kammen, D. M. (2014) 'Spatial distribution of U.S. household carbon footprints reveals suburbanization undermines greenhouse gas benefits of urban population density', *Environmental Science and Technology*, 48(2), pp. 895–902. doi: 10.1021/es4034364.

Kahneman, D. and Krueger, A. B. (2014) 'Developments in the Measurement of Subjective Well-Being', *The Journal of Economic Perspectives*, 20(1), pp. 3–24.

Kawachi, I., Subramanian, S. and Kim, D. (2008) 'Social Capital and Health: A Decade of Progress and Beyond', in Kawachi, I., Subramanian, S., and Kim, D. (eds) *Social Capital and Health*. New York: Springer, pp. 1181–8. doi: 10.1016/S0277-9536(98)00190-7.

Kennedy, Daniel; Adolphs, R. (2011) 'Stress and the city', *Nature*, 474, p. 252. doi: 10.1890/1540-9295-11.5.228.

Kim, D, Subramanian, S. V and Kawachi, I. (2008) 'Social capital and physical health: A systematic review of the literature', in Kawachi, I., Subramanian, S., and Kim, Daniel (eds) *Social capital and health*. New York: Springer, pp. 139–190. doi: 10.1016/S0277-9536(98)00190-7.

Kim, J. and Kaplan, R. (2004) 'Physical and Psychological Factors in Sense of Community', *Environment and Behavior*, 36(3), pp. 313–340. doi: 10.1177/0013916503260236.

King, N. and Horrocks, C. (2010) 'An Introduction to Interview Data Analysis', in *Interviews in Qualitative Research*. London: SAGE Publications, Ltd., pp. 142–174.

Knudsen, B. *et al.* (2007) *Urban Density, Creativity, and Innovation*. Available at: https://creativeclass.com/rfcgdb/articles/Urban_Density_Creativity_and_Innovation.pdf.

Kong, F., Yin, H. and Nakagoshi, N. (2007) 'Using GIS and landscape metrics in the hedonic price modeling of the amenity value of urban green space: A case study in Jinan City, China', *Landscape and Urban Planning*, 79(3–4), pp. 240–252. doi: 10.1016/j.landurbplan.2006.02.013.

Koyama, S. *et al.* (2014) 'Social Support Improves Mental Health among the Victims Relocated to Temporary Housing following the Great East Japan Earthquake and Tsunami', *Tohoku J. Exp. Med*, pp. 241–247. doi: 10.1620/tjem.234.241.Correspondence.

Kroll, F. and Haase, D. (2010) 'Does demographic change affect land use patterns?A case study from Germany', *Land Use Policy*. Elsevier Ltd, 27(3), pp. 726–737. doi: 10.1016/j.landusepol.2009.10.001.

Langer, A. (2012) 'Pure Urban Nature: Nature-Park Sudgelande, Berlin', in Jorgensen, A. and Keenan, R. (eds) *Urban Wildscapes*. New York: Routledge, pp. 152–159.

Latkin, C. a and Curry, A. D. (2003) 'Stressful neighborhoods and depression: a prospective study of the impact of neighborhood disorder.', *Journal of health and social behavior*, 44(1), pp. 34–44. Available at: http://www.ncbi.nlm.nih.gov/pubmed/12751309.

Ledo, W. (2014) 'Viver em Lisboa: Conheça as zonas mais caras, jovens e com maior densidade populacional', *Jornal de Negócios*, 11 September, pp. 2–5.

Lestegás, I. (2019) 'Lisbon After the Crisis: From Credit-fuelled Suburbanization to Tourist-driven Gentrification', *International Journal of Urban and Regional Research*, 43(4), pp. 705–723. doi: 10.1111/1468-2427.12826.

Lima, M. F. and Eischeid, M. R. (2017) 'Shrinking cities: rethinking landscape in depopulating urban contexts', *Landscape Research*. Routledge, 6397(September), pp. 1–8. doi: 10.1080/01426397.2017.1372167.

Lokman, K. (2017) 'Vacancy as a laboratory: design criteria for reimagining social-ecological systems on vacant urban lands', *Landscape Research*. Routledge, 42(7), pp. 728–746. doi: 10.1080/01426397.2017.1355446.

MacDonald Gibson, J. *et al.* (2015) 'Predicting urban design effects on physical activity and public health: A case study', *Health and Place*. Elsevier, 35, pp. 79–84. doi: 10.1016/j.healthplace.2015.07.005.

Mair, C., Kaplan, G. A. and Everson-Rose, S. A. (2012) 'Are there hopeless neighborhoods? An exploration of environmental associations between individual-level feelings of hopelessness and neighborhood characteristics', *Health and Place*. Elsevier, 18(2), pp. 434–439. doi: 10.1016/j.healthplace.2011.12.012.

Manville, M. and Kuhlmann, D. (2018) 'The Social and Fiscal Consequences of Urban Decline: Evidence from Large American Cities, 1980–2010', *Urban Affairs Review*, 54(3), pp. 451–489. doi: 10.1177/1078087416675741.

Maruani, T. and Amit-Cohen, I. (2013) 'Marketing landscapes: The use of landscape values in advertisements of development projects', *Landscape and Urban Planning*. Elsevier B.V., 114, pp. 92–101. doi: 10.1016/j.landurbplan.2013.02.012.

Matheson, F. I. *et al.* (2006) 'Urban neighborhoods, chronic stress, gender and depression', *Social Science and Medicine*, 63(10), pp. 2604–2616. doi: 10.1016/j.socscimed.2006.07.001.

Matsuoka, R. H. and Kaplan, R. (2008) 'People needs in the urban landscape: Analysis of Landscape And Urban Planning contributions', *Landscape and Urban Planning*, 84(1), pp. 7–19. doi: 10.1016/j.landurbplan.2007.09.009.

McKee, A. J. (2014) 'Broken Windows Theory', *Encyclopædia Britannica*.

Mehdipanah, R. *et al.* (2018) 'Urban renewal, gentrification and health equity: A realist perspective', *European Journal of Public Health*, 28(2), pp. 243–248. doi: 10.1093/eurpub/ckx202.

Mitchell, R. (2012) 'Is physical activity in natural environments better for mental health than physical activity in other environments?', *Social Science & Medicine*. Elsevier Ltd, 91, pp. 130–134. doi: 10.1016/j.socscimed.2012.04.012.

Mitchell, R., Astell-Burt, T. and Richardson, E. a (2011) 'A comparison of green space indicators for epidemiological research.', *Journal of Epidemiology and Community Health*, 65(10), pp. 853–8. doi: 10.1136/jech.2010.119172.

Mitchell, R. and Popham, F. (2008) 'Effect of exposure to natural environment on health inequalities: an observational population study.', *Lancet*. Elsevier Ltd, 372(9650), pp. 1655–1660. doi: 10.1016/S0140-6736(08)61689-X.

Mohnen, S. M. *et al.* (2012) 'Health-related behavior as a mechanism behind the relationship between neighborhood social capital and individual health - A multilevel analysis', *BMC Public Health*, 12(1). doi: 10.1186/1471-2458-12-116.

Nassauer, J. I. and Raskin, J. (2014) 'Urban vacancy and land use legacies: A frontier for urban ecological research, design, and planning', *Landscape and Urban Planning*. Elsevier B.V., 125, pp. 245–253. doi: 10.1016/j.landurbplan.2013.10.008.

Nilsson, K. *et al.* (2013) *Peri-Urban Futures: Scenarios and Models for Land Use Change in Europe*. Verlag Berlin Heidelberg: Springer. doi: 10.1007/978-3-642-30529-0.

Orme, B. (2010) 'Interpreting the Results of Conjoint Analysis', in *Getting Started with Conjoint Analysis: Strategies for Product Design and Pricing Research.* Madison: Wis. Research Publishers LLC, pp. 77–88.

Orme, B. K. and Johnson, R. M. (2008) *Testing Adaptive CBC: Shorter Questionaires and BYO vs 'Most Likelies'*. Available at: http://www.sawtoothsoftware.com/support/technical-papers/adaptive-cbc-papers/testing-adaptive-cbc-shorter-questionnaires-and-byo-vs-most-likelies-2008.

Oswalt, P. (2008) 'Shrinking Cities', in Oswalt, P. (ed.) *Shrinking Cities*. Berlin: Project Office Philipp Oswalt, pp. 3–28.

Oswalt, Philipp (2005) *Shrinking Cities*. Edited by Phillip Oswalt. Ostfildern-Ruit: Hatje Cantz.
Paivio, A. (1991) 'Imagery and Language', in *Images in Mind: The Evolution of a Theory*. New York: Harvester Wheatsheaf, pp. 107–133.

Panagopoulos, T., Guimarães, M. H. and Barreira, A. P. (2015) 'Influences on citizens' policy preferences for shrinking cities: a case study of four Portuguese cities', *Regional Studies, Regional Science*, 2(1), pp. 140–169. doi: 10.1080/21681376.2015.1010225.

Panduro, T. E. and Veie, K. L. (2013) 'Classification and valuation of urban green spaces-A hedonic house price valuation', *Landscape and Urban Planning*. Elsevier B.V., 120, pp. 119–128. doi: 10.1016/j.landurbplan.2013.08.009.

Pietilä, M. *et al.* (2015) 'Relationships between exposure to urban green spaces, physical activity and self-rated health', *Journal of Outdoor Recreation and Tourism*. Elsevier, 10, pp. 44–54. doi: 10.1016/j.jort.2015.06.006.

Rautio, N. *et al.* (2018) 'Living environment and its relationship to depressive mood: A systematic review', *International Journal of Social Psychiatry*, 64(1), pp. 92–103. doi: 10.1177/0020764017744582.

Reckien, D. and Martinez-Fernandez, C. (2011) 'Why Do Cities Shrink?', *European Planning Studies*, 19(8), pp. 1375–1397. doi: 10.1080/09654313.2011.593333.

Rink, D. and Haase, Annegret; Bernt, Matthias; Grossmannn, K. (2012) *Shrink Smart: The Governance of Shrinkage within a European Context*. Leipzig. Available at: https://shrinksmart.ufz.de/data/D9 Research Brief 214223.pdf).

Rodríguez, D. *et al.* (2009) 'Land use, residential density, and walking. The multi-ethnic study of atherosclerosis.', *American Journal of Preventive Medicine*, 37(5), pp. 397–404. doi: 10.1016/j.amepre.2009.07.008.

Roe, J. *et al.* (2013) 'Green Space and Stress: Evidence from Cortisol Measures in Deprived Urban Communities', *International Journal of Environmental Research and Public Health*, 10, pp. 4086–4103. doi: 10.3390/ijerph10094086.

Roebeling, P. *et al.* (2017) 'Assessing the socio-economic impacts of green/blue space, urban residential and road infrastructure projects in the Confluence (Lyon): a hedonic pricing simulation approach', *Journal of Environmental Planning and Management*. Taylor & Francis, 60(3), pp. 482–499. doi: 10.1080/09640568.2016.1162138.

Ryan, B. (2012) 'Shrinkage or Renewal? The Fate of Older Cities, 1950-90', in *Design After Decline: How America Rebuilds Shrinking Cities*. Philadelphia: University of Pennsylvania Press, pp. 37–83.

Ryan, M. (2004) 'Discrete choice experiments in health care', *BMJ*, 328(7436), pp. 360–361. doi: 10.1136/bmj.328.7436.360\r328/7436/360 [pii].

Sambandam, R. (no date) *Conjoint Analysis versus Self-Explicated Method: A Comparison*, *TRC. Consumer Insights. Market Innovation.* Available at: http://www.trchome.com/white-paper-library/wpl-all-white-papers/209 (Accessed: 20 February 2014).

Sampson, R. J. and Raudenbush, S. W. (2000) 'Systematic Social Observation of Public Spaces : A New Look at Disorder in Urban', *American Journal of Sociology*, 105(3), pp. 603–652.

Sattler, H. and Hensel-Borner, S. (2003) 'A Comparison of Conjoint Measurement with Self-Explicated Approaches', in Gustafsson, A., Herrmann, A., and Huber, F. (eds) *Conjoint Measurement: Methods and Applications*. 4th edn. New York: Springer, p. pp 473-504.

Schetke, S. and Haase, D. (2008) 'Multi-criteria assessment of socio-environmental aspects in shrinking cities. Experiences from Eastern Germany', *Environmental Impact Assessment Review*, 28(7), pp. 483–503. doi: 10.1016/j.eiar.2007.09.004.

Smith, G. D., Shaw, M. and Dorling, D. (1998) 'Shrinking areas and mortality', *Lancet*, 352(9138), pp. 1439–1440. doi: 10.1016/S0140-6736(05)61261-5.

Spirn, A. W. (1984) *Granite Garden: Urban Nature and Human Design*, *Granite Garden: Urban Nature and Human Design*. New York: Basic Books. doi: 10.2307/3105172.

Terschüren, C. *et al.* (2009) 'Health status of "Ruhr-City" in 2025--predicted disease burden for the metropolitan Ruhr area in North Rhine-Westphalia.', *European Journal of Public Health*, 19(5), pp. 534–40. doi: 10.1093/eurpub/ckp060.

Tyrväinen, L. and Miettinen, A. (2000) 'Property Prices and Urban Forest Amenities', *Journal of Environmental Economics and Management*, 39(2), pp. 205–223. doi: 10.1006/jeem.1999.1097.

Tzoulas, K. *et al.* (2007) 'Promoting ecosystem and human health in urban areas using Green Infrastructure: A literature review', *Landscape and Urban Planning*, 81(3), pp. 167–178. doi: 10.1016/j.landurbplan.2007.02.001.

Ward Thompson, C. (1998) 'Historic American Parks and Contemporary Needs', *Landscape Journal*, 17(1), pp. 1–25.

Ward Thompson, C. *et al.* (2012) 'More green space is linked to less stress in deprived communities: Evidence from salivary cortisol patterns', *Landscape and Urban Planning*. Elsevier B.V., 105(3), pp. 221–229. doi: 10.1016/j.landurbplan.2011.12.015.

Ward Thompson, C. and Aspinall, P. (2011) 'Natural Environments and their Impact on Activity, Health, and Quality of Life', *Applied Psychology: Health and Well-Being*, 3(3), pp. 230–260. doi: 10.1111/j.1758-0854.2011.01053.x.

Ward Thompson, C. and Silveirinha de Oliveira, E. (2016) *Evidence on health benefits of urban green spaces*. Copenhagen. Available at: http://www.bcn.cat/estadistica/angles/dades/anuari/cap01/C0101140.htm.

Wolch, J. R., Byrne, J. and Newell, J. P. (2014) 'Urban green space, public health, and environmental justice: The challenge of making cities "just green enough"', *Landscape and Urban Planning*. Elsevier B.V., 125, pp. 234–244. doi: 10.1016/j.landurbplan.2014.01.017.

Wood, A. (2009) *Green infrastructure guidance*, *Natural England Report 176*. London. Available at: http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Green+Infrastructure+Guidance#0.